

THE DIFFUSION EXPEDITION.

Notes on the Trip—The Makee Sugar Company's Plantations—Personal Items.

There was nothing to excite wonder or stimulate curiosity on the trip of the Inter-Island Steam Navigation Co.'s steamer *Makahala*, leaving Honolulu on Tuesday the 15th inst. for Kaula. It was a very smooth passage past the island of Oahu, changing to a stiff breeze with lively billows crossing the channel. No whales came up to blow, nor sharks to covet a supper—nothing animate amidst the sheen of the waves but sea birds and flying fish. A half-clouded sky, making the moon, the bright new mariner's light on Barber's Point, and the mountains receding into distance and night, combined to relieve the throbbing steamer from desolation. Two editors sat or leaned on the stern rail till a late hour, arranging the course of state affairs for a decade in advance.

Speaking of Barber's Point light, Capt. Freeman expressed his gratification at the recent boom. It was a great aid to the coasting trade between Honolulu and Kaula. They could now make the most direct route possible, whereas formerly it was necessary for safety to give the land a wide berth on a dark night, making the passage much longer than with this aid to navigation.

Between the rivalry of Neptune and Morpheus in seeking control over the representatives of the press, the latter scarcely knew whether their heads or heels were uppermost—their gastronomic diffusion apparatus were certainly upside down—when the signal was given, at three o'clock in the morning, to go ashore at Nawiliwili. A pull of a few hundred rods in a boat landed the half-dozen passengers for that point upon the solid strand. Hon. W. H. Rice's stage coach was waiting, in which a start was shortly made for Kealia, some twelve miles distant. There was another coach standing there bound for Koloa, which looked to be more roomy and painted brighter. True to their instincts of taking the best that was going, the scribes placed their gripsacks on board the wrong coach. They did the same with the baggage and parcels of a lady passenger of identical destination. The mistake was not discovered and rectified a moment too soon, but if otherwise it would have made little difference to the editors, for they never unpacked their (comparatively) good clothes until they returned to town. Besides the lady (Mrs. C. M. White, at whose wedding the writer had been present a few months ago), Mr. J. N. S. Williams was a passenger as far as Lihue.

It was pretty dark in setting out—barely enough starlight to distinguish cane fields from lantana jungles—but our fellow-passengers kindly named localities and indicated points of interest. The road winds in a horse-shoe bend over the brink of a precipice several hundred feet above a broad gulch. This is the divide between Lihue and Hanalei, and the road has recently been changed from a location higher up on the land, in order to avoid the steeper gradient. There ought, however, by all means, to be a stout rail provided at the bend in question, for at present it is imminently dangerous to life. The slightest prank a horse may play at the spot is liable to hurl one or many persons down to certain and fearful death.

The road is in good repair all the way to Kealia, and information is that it is even better beyond to Kilauea. After rain, as on this occasion, the road is from the nature of the soil heavy and sticky; but being dry on the return trip it made one of the smoothest and most agreeable carriage drives. Kaula roads, it cannot be disputed, are kept up to a very good reputation. At the high hills encountered the pressmen got out to relieve the four horses of about 275 pounds burden, but on mounting the coach again brought in on their feet something less than a ton of the "garden" soil.

Day was dawning before half the route was covered, revealing the ocean waves breaking to the right and sublime mountain scenery to the left—the latter varied by broad pastures and meadows, with lowly cabins and little hamlets at intervals. The Wailua river has never had its bridge replaced since being washed away in a flood, and the coach and four is conveyed across on a punt operated by a native living at the spot. A smaller stream further on is forded with ease, the water not coming up to the axles. During freshets, however, there is no thoroughfare across the beds of these streams, and on the earliest possible opportunity the Government should have causeways, with central bridges above high water mark, constructed at the points in question.

It was clear day when Kapaia was reached. Among the first objects of interest noticed is Col. Z. S. Spaulding's race track and stables. Hundreds of cattle are scattered on the plains and meadows between the mountain and the sea. Our fair friend forgets her fatigue and lung fast in the kindly effort to acquaint the visitors with the lay of the land. Hon. Geo. H. Dole's breezy perch, in the midst of a beautiful grove on a mountain ridge, is pointed out. Conspicuous at the longest range is the tall, round, stone chimney on the Kapaia mill site. Not a vestige of the mill remains, as, since the annexation of the Kapaia and Kealia plantation interests, the milling is all done at Kealia.

As the coach stops opposite his snug cottage, Mr. C. M. White, principal of the Government school, emerges and joins his returning spouse in a hearty proffer of hospitality to the editorial contingent, which is gratefully accepted more out of pleasure at being entertained by a kindred spirit, than from any fear of having to rough it by going further. After having hands and faces in cool water, the guests have only a wait of a few minutes for a substantial breakfast—an achievement worthy of note on the part of the host and hostess, seeing that the former has been keeping bachelor's hall for several weeks and the latter has just completed a trying journey by sea and land. Breakfast over there is a goodly interval before school time, improved by offing discussion of home and foreign affairs, in which the host displays resources of argument that the head-tired journalists, when taking opposite ground, find coping with no easy task. The principal is accom-

panied to his school, which occupies two well-appointed buildings. He is assisted efficiently by Mrs. Sherman and Mrs. Nugent. The pupils of the advanced department were during our visit exercised in dictation, and their spelling and writing approved most carefully. There are Hawaiians, Portuguese, Scandinavians, Chinese, Japanese and other nationalities in the school, and representatives of every race do excellent work. Probably the best in all points, of those not born to English, were the Hawaiians. Mr. White is an enthusiastic teacher, his school taking place in his mind to no other concern. An inspection of other work and departments is postponed to an opportunity that, unfortunately, never arrives to the visitors. The restful air makes them averse to activity and thus robs them of much information that would be valuable to carry back to their editorial lairs.

From the schoolhouse to the Kealia mill is only about half a mile, the road passing over a substantial bridge spanning a wide creek. Aloft runs on a huge trestle the plantation flume, extending for miles into the cane fields. The visitors are greeted at the mill by a "man on horseback" in the person of Hon. G. H. Dole, who is plantation superintendent on the Kapaia division of the estate, as Mr. W. Blaisdell is on the Kealia division. Then with cheery faces steps up Mr. Theo. P. Severin, the traveling photographer of Mr. J. J. Williams' studio, who escorts the wanderers into the building where the diffusion process is located. Here we are presented to Mr. John Sherman, who goes all over and explains every point in the process. Col. Spaulding himself next appears, piloting a party of ladies through the wondrous labyrinth of massive machinery and apparatus. The colonel spies the invited scribes and coming forward gives them a hearty welcome, followed by a thorough object lesson in the whole process. (The lady visitors afterward complained to the editors that the latter had divided the gallant colonel's attention to them when the diffusion process was only half unfolded to their interested comprehension. This was "real mean" on the part of the scribes, although altogether unintentional.)

After infusing all the ideas possible regarding diffusion, the visitors were directed to the hotel just erected by Col. Spaulding a few paces from the mill. This has been provided primarily for the benefit of the higher class of workmen in the mill and fields, who have not homes of their own on the estate, and incidentally for the entertainment of visitors and tourists. It is kept in excellent style, skilled cooks and attentive waiters being employed, with liberal supplies to draw from, and the six bedrooms in the second story being fit for princes. The tables are spread with immaculate linen covers and napkins, and the mill hands comport themselves as gentlemen, thus fittingly evincing appreciation of the thoughtful consideration that dictated such elegant comfort in their behalf. If similar establishments were provided at every plantation on the group, a great obstacle to internal touring would be removed, while moderate charges to strangers would pay for their entertainment, inter-island trade would be facilitated and, in short, the whole Kingdom be benefited.

It was at the lunch table in the hotel on the first day—Wednesday, May 16th—that the deputation was informed of the breakage of an attachment to the diffusion plant. As the heads of the twain had just come from beneath the ponderous weights, one of which fell in the accident, they congratulated themselves on having whole craniums left in which to carry their brains home. Next day another weight fell, and the decree was issued, to clear up for grinding at 6 o'clock in the evening. This gave an unexpected opportunity of seeing the maceration process in operation. During the afternoon the flumes were altered from delivering to the diffusion plant, and diverted into the crushing mill. At the hour appointed the endless procession of cane came rushing down to the mill travelers, the three ponderous 10-ton rollers of the first mill began crunching their food, and, after receiving a liberal affusion of hot water from a perforated pipe, the crushed cane with its residue of unexpressed juice moved forward on an endless traveler to the maceration rollers, whence a goodly stream of the sacchariferous liquid ran to join the primary stream from the first mill on its way to the clarifiers, while the doubly macerated fibre of the cane moved on by still another system of carriers to be dumped into the furnaces and furnish a large quota of power and heat to the whole vast scheme of sugar manufacture. So day and night the immense operation would continue like clock work while repairs to the diffusion plant could be effected. All the handling the cane receives at Kealia between the field and the crusher or cutter, as the case may be, is to regulate the feeding at the outlet of the flume.

The Makee Sugar Company's property combines the former plantations and mills of Kapaia and Kealia, the mill on the latter site now doing the whole grinding. There is a total area of about 58,000 acres, 2,700 to 3,000 being constantly under cultivation. About 1,000 acres are freshly planted every year, the crop taking eighteen months to mature, and another crop is raised from ratoons, or second growth from one planting. The sugar crop this year will be about 5,000 tons. Excellent pasture lands stretch away from the bounds of the cane fields, upon which 6,000 head of cattle graze, with a natural increase of some 1,200 a year. About forty-five or fifty head per month are required for plantation beef, and an equal number are sold to outside dealers. Col. Spaulding also owns many horses, including a large proportion of thoroughbred stock. Besides the race track mentioned previously, he has another in the vicinity of his residence.

Mr. Sherman, the chief engineer of the mill, went over the works repeatedly with the visitors, explaining every part of the manufacture. He has every detail at his finger ends, and his views on any matter related to the industry are well worth treasuring in memory. In previous portions of this narrative, the different processes of obtaining the juice from the cane—by maceration and by diffusion—have been described. It should have been stated that the power for the milling operations is furnished by two engines respectively of 80 and 100 horse power. There are special engines for running the centrifugal machines, pumping apparatus, etc., and a very ingenious, automatic, steam

pump for feeding the boilers, which is self-regulating and a great saver of both care and labor. An outline of the process of transforming the raw juice into sugar may now be attempted.

From a receiving tank the juice is pumped into the clarifiers, of which there are eight with a capacity of 150 gallons each. Heat is applied by steam pipes until boiling is produced, when lime is thrown into the liquid, bringing a foaming mass of impurities to the surface. This scum is swept off into receivers as the liquor is boiled to a certain density, ascertained by tests, after which the contents are drawn off at the bottom of the clarifiers and conducted to the cleaning pans. There are five of these pans in the Kealia mill, and in them the liquor is further heated and skimmed. Then it is led into two mixers, respectively of twenty and sixteen tons capacity. The mass is now very much thickened in consistency, and is pumped into the double effects, there being two of these great utensils, where it is boiled in a vacuum—the hot vapor from one caldron of the double effect sufficing to boil the mass in the other. The juice has now become molasses and is pumped into the vacuum pans, there being also two of these apparatus—one a monster of sixteen tons capacity made by Dealey of New York, the other holding eight tons made by the Honolulu Iron Works. Here the molasses is evaporated into sugar in a vacuum produced by the condensation of its escaping vapor, but it is such sugar as none of our readers would have his cup sweetened with—a vile-looking, black mud. The boiling in vacuum, as no doubt is generally known, is designed to effect the process in a lower degree of heat than is necessary to boil a liquid in the open air, and the especial object is to prevent the formation of what is called invert sugar—a substance inferior in solubility, sweetness and wholesomeness to the true article, and one which interferes with the graining or crystallization of the product. A fully cooked batch in the vacuum pan is called a "strike," and it is dropped through the bottom into troughs, whence it is admitted as desired into the centrifugals. There are twelve of these machines, their operation being one of the most interesting sights the mill affords to a visitor. They are globular shaped vessels mounted on upright spindles, with a close-woven web running all round a space inside the shell. The black saccharine product above mentioned is dumped into the vessel, the latter is revolved with extreme velocity. In an incredibly short time—only a few seconds—the mixture is seen to grow light in color until it attains a white-brown. It is comparatively dry, clear and crystallized sugar now, the liquid matter that carried it having been driven by centrifugal force through the meshes of the web. Only four men are required to attend the twelve centrifugal machines, the same number that it takes to run three or four. A second grade of sugar is made by the reduction of washings of the different boiling apparatus and that of the liquor from the filter presses. There are three 40-inch frame filter presses in this mill, their use being to express the liquor from residuum gathered at bottoms of the clarifiers and pans. These presses have valves for releasing air bubbles in the tubes, which is held to be a great improvement on other kinds.

The more skilled employees of the mill—chemist, engineer, sugar boilers, carpenters, etc.—are Americans and Europeans, but Japanese are in great favor as sub-engineers and tenders of different apparatus. The Japanese are very teachable and faithful to their duties withal. One of them who came to the mill without any knowledge of English, about a year ago, has been taught by Mr. Sherman to keep the record of the output of sugar, doing it with neatness and legibility. Japanese women sew the mouths of the sugar bags, with a celerity that those of other nationalities never attained. Chinese, Japanese and Portuguese divide the labor of the fields, and the company's pay roll numbers seven or eight hundred people. The daily product of the mill, running day and night, is about 40 tons of sugar. Instead of being housed in a single village, the laborers' cabins are scattered in small hamlets all over the estate—the habitations being usually clustered by nationalities—and this system has the advantage of having laborers living near the different fields in sufficient numbers to work them. As a rule, house plots are cultivated as vegetable gardens, giving a thrifty respect to the scene.

All the scribbling that has up to this point come out of the editorial visit of the GAZETTE and Bulletin to Kaula has very little of a holiday appearance. Nevertheless pleasure was diffused amongst duty in a very high degree of density. Particularly was this the case with the Bulletin. That paper's representative was his own boss, needing not to write up a "stickful" of his observations unless he pleased. The GAZETTE man, however, being a hireling, was bound to care for his paper's nourishment or become liable to the "grand bounce." There was a centrifugal influence constantly impelling the GAZETTE to fly beyond the Waialeale mountains and see what was on the other side, but the utter inertness of the Bulletin counteracted to prevent the wearisome flight. As latter persons tipped the sugar scales at 138 pounds—two pounds of increase in two days at the Colonel's hotel—there was a preponderance of five pounds avoirdupois against the GAZETTE's fugitive impulse. Another restraining influence upon inordinate industry was pleasant company of friends discovered at Kealia, who could not do too much to make the visitors' stay enjoyable. Besides Mr. and Mrs. C. M. White's hospitable reception, previously acknowledged, there were Col. R. C. Spaulding, Mr. Severin, Mr. G. H. Tweedie, Mr. Nugent and Mr. Chas. Purdy, all of "old acquaintance," and Mr. Fairchild, Mr. Sherman and Mr. Blaisdell, newly introduced, all of whom did their utmost to entertain the strangers, although doubtless without any motive of accidentally striking an angelic bonanza in either of them. It was well, probably, for the GAZETTE that he lay under the double incubus of a rest-seeking companion's obdurate will and the profuse kindness of a legion of friends. This conclusion may develop in the reader's mind as he proceeds.

One afternoon Mr. Severin procured three Japanese horses—that is, he hired the animals from Japanese—and invited the editors to a ride over the Kapaia and Kealia plantations. Gaily the trio cantered away, the GAZETTE making up for indifferent equestrianism by a determination not to "get left," his intrepidity thus becoming an offset to the gallant bearing of his haughty compeers. It was a delightful ride up the steep and winding road overlooking the village of Kapaia. Refreshingly green pastures, intervals and vegetable gardens, interspersed with the laborer's cabins, formed the near prospect below, with the restless ocean fringed with breakers meeting the farther view; while on the other hand rose the picturesque peaks, notches, turrets and pyramids of the mountain range, with great expanses of cane fields in the foreground. The air was invigorating. Our guide made the remark that the GAZETTE did not look too much like General Grant on a horse. This was taken as highly complimentary, in leaving the inference that the subject of remark looked like the famous General off a horse. Enquiries of a Chinaman on the road and of Japanese at one of their settlements enabled the party to catch a trail, after several attempts, leading across the Kealia river, that on being reached was easily found. A magnificent cascade and several smaller but still beautiful ones were seen on either hand. Col. Spaulding's residence was deserted from a height away down in a gorgeous vale, and it was determined to connect with the main road in that vicinity. But this piece of exploring tactics was easier resolved than executed.

A broad irrigation ditch was encountered athwart the trail, requiring not only trained horses but skilled equestrianism to cross. The Bulletin's gallant bearing became modified into a subdued demeanor, as he dismounted to find if his steed could jump the chasm. The animal could and did make the flying leap, when its rider was satisfied, considering it unnecessary to recross the stream for the fun of vaulting over in saddle. This is where the GAZETTE's intrepidity scored a signal triumph, making even accounts with the overt sneers, freely cast by his companions at his galloping posture. With a Boulanger glance in his eye, disdaining to get off and lead his charger, the hitherto despondent equestrian coolly rode to the brink of the gaping void, and in a moment his lively quadruped stood squarely on the opposite bank—the best fun the rider had since he fell off a tree in boyhood.

The hospitable guide was less fortunate, being unable to ride, drag, chase, or by any sort of duress make his best take the ditch. Then the other horses absolutely refused to turn back, so that with mingled sorrow and apprehension we left the guide, calling on him to meet us "over there." Now the Bulletin took on a new aspect. He was again the dashing pioneer of the Australian bush, with full faith in the *ultima thule* at the end of the most devious cattle tracks. Although the present writer's experience was that cattle, having to walk to the wilderness before making tracks back, were just as apt to lead the wayfarer into the woods as out of them, still he deferred with resignation to the guidance of the veteran bushranger. The confidence was justified, for after a long and tortuous ride through lantana thicket and forest, over gulch and precipice, we came out leading our horses down one of the steepest of mountain spurs to the rear of Colonel Spaulding's, whence the main road was easily gained and a riding companion overtaken in the person of Mr. Huntley, who has charge of the live stock of the Makee Sugar Company.

Colonel Spaulding's retreat reaches a high ideal of rural luxury. An elegant house surrounded by beautifully laid out and well cultivated grounds, its artistic finish scarcely requires the enhancement of grand natural scenery by which it is environed. A checker-board pavement in fact leads down to a lovely pond fringed with shrubbery. Marvelous strawberries are raised on the grounds. The proprietor was absent, however, and the editors only heard about the berries next day. When the adventurers returned to Kealia, they found that no small concern had been felt for their fate, the guide having returned before them over the road by which the party went. His obstinate horse earned him an amount of rather heartless jibing at the hotel table, but his good-nature was proof against everything. Next day the visitors had to take the steamer for home, and in the morning they left their shadows in the photographer's camera, as raw material for souvenirs of the occasion and samples of difficult work. The coach ride to Nawiliwili was exceedingly pleasant, notwithstanding the crowded accommodation. There were nine persons including the driver on the three seats—the Bulletin says eight, but forgets "that boy" whom the GAZETTE selfishly wished to have postponed his journey—also a very wise-looking parrot that must have been disappointed in hearing no politics from the editors. The Bulletin for the first few miles seemed to be in distress, his misery proving to be of a matchless sort. On getting the last match for his companion, however, he still seemed to be in trouble. An offer of the lee side of the coach to the sufferer being overheard by the two ladies in the middle seat, they very graciously informed him that he might smoke to his heart's content—indeed, it would give them pain if he deprived himself of his accustomed indulgence. This amiable assurance had the effect of quickly changing the appearance of the vehicle—as it might be viewed from a mile away—into that of a locomotive.

Parts of the landscape invisible on the trip were now to be surveyed. They included the plantations and mills of Hanalei and Lihue. The cane looked fine, and the mills were grinding. Very neat cabins, regularly ranged in rows, are provided for the labor. Hon. W. H. Rice's residence, beautifully situated on the summit of a hill near the landing, is remarkable for one thing in being embowered in a splendid grove, royal palms being conspicuous among a variety of trees—remarkable, because fifteen years ago there was nothing bigger than a weed growing on the place, and the present umbrageous wealth is the growth almost exclusively from the planting by the fair hands of Mrs. Rice. Neither of the press tourists knew much about Kaula geography, topography or meteorology, and Thrum's Almanac skips Kaula in its table of elevations. It is said, however, that the higher peaks of

the Waialeale range on that island are almost perpetually swathed in clouds, and one of the very rare sights of Lihue is a glimpse of their terrestrial sublimities.

Nawiliwili landing is, they tell us, always thronged on steamer days. This day there were in the assemblage Hon. W. H. Rice and G. N. Wilcox, Dr. Walters, Messrs. Lucas and Wishard (teachers at Lihue), Sheriff S. W. Wilcox (coming to town), Willis from Kapaia, Spencer and others. The portly presence of Mr. C. O. Berger on the landing gave a Merchant street welcome home in advance, besides stirring up fond memories of Honolulu almost diffused away in the Kauaiian zephyrs. Mr. Rice, out of compliment, revoked the two newspaper men's coach fares, for which he is openly thanked.

The electric lights of Honolulu were run nearly together in a glowing crescent of brilliants, when seen from far to sea before dawn on Sunday morning. When put out they disappeared all at once like a flash of lightning. Although, according to information freely tendered, we have not seen the best parts of Kaula by a great deal, yet the pilgrimage was to the Diffusion Process of Kealia. If that has been explained with passable clearness, readers may be enabled to diffuse from the mass of wordlessly recorded holiday observations, upon other things incidentally viewed, a few grains of knowledge concerning "the garden isle," a territory that might with advantage to the cause of tourist travel have its attractions better advertised.

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